

to the ever increasing numbers of these parasites that the size of the individuals composing the incoming generations of *Aurelia* continued to become more and more diminutive. I shall, however, attend to all these points more closely next year, after which I shall doubtless be able to speak with more certainty regarding them.

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Notes on the Venous System of Birds.

By CHARLES H. WADE, F. L. S.

[Read April 6, 1876.]

I PROPOSE in the present paper briefly to draw attention to certain structural features in the anatomy of some birds. I cannot claim that my discoveries are original, except in so far as they were made without knowledge of previous work done in the same field by other observers; but, as I hope to show, the points of which I shall particularly treat are so important, and have obtained so little recognition hitherto, that no apology seems necessary for introducing them to the notice of this Society.

My interest in this subject was first excited a few weeks ago, when, in dissecting a specimen of a common Tomtit (the Marsh-Titmouse, *Parus palustris*) I was surprised to find present, as it appeared, only one jugular vein, the right. A second specimen showed a like deviation from the normal type; and, noting this, I made a regular excursion through the well-known text-books, in the hope they might contain some explanation which had before escaped my reading. I may briefly detail the results of my search.

Owen contents himself with saying (*Anatomy of Vertebrates*, ii. 203), "The vein of the right side exceeds the other in size; it is often twice as large." To what considerable extent the statement needs modifying I will show directly.

Milne-Edwards says (*Leçons sur la Physiologie &c.*, vol. iii. p. 466) "The jugular veins are placed superficially on the sides of the neck; sometimes they are (both) of pretty nearly the same calibre; but in general that of the left side remains very attenuated, while that of the right side presents a considerable volume."

Gegenbaur, who seems closely to have followed Milne-Edwards, says (I quote from the French translation by Carl Vogt, p. 804), "there is atrophy of one of the jugular veins (the left); it is by

the transverse trunk the passage of the blood into the right jugular is effected." Van der Hoeven does not, in his 'Handbook of Zoology,' enter on the question at all; nor is it referred to in the other frequently used books, such as Rymer Jones's 'Animal Kingdom' &c.

Such meagre references were not sufficient in face of the very emphatic results of my own observation, continued dissections forcing on me the desirability of further investigation. I will therefore now give the facts with which I have become acquainted.

In the common Red-wing (*Turdus iliacus*) the right jugular is very apparent, offering a diameter of one eighth of an inch, while the corresponding vein of the left side needs for its demonstration a very delicate dissection under water, when it may be traced forwards from its point of union with the great transverse trunk at the base of the skull. A safe guide to its homology is found in the accompanying vagus nerve. Figure 1 shows the course of the two veins.

In the Short-tailed Tit (*Parus britannicus*) this suppression of the left jugular attains the extreme limits compatible with its existence as a vessel, and a lens is necessary to enable one to trace it downwards with the pneumogastric nerve. In one specimen a very fine streak of included blood gave some assistance in determining the presence and course of the tube; but even it disappeared at a point about 3 lines above the clavicle.

Diagrams of cervical blood-vessels in two British birds.

Fig. 1.

Fig. 2.

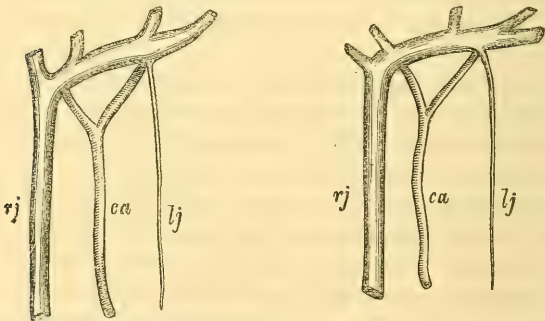


Fig. 1. The Redwing (*Turdus iliacus*).

2. The Short-tailed Titmouse (*Parus britannicus*): *rj*, right, and *lj*, left jugular vein; *ca*, carotid artery.

In effect, I concluded that in this bird the left jugular vein is a

mere *rudimentary structure*, physiologically valueless, while at the same time the full morphological equivalent of the vein of corresponding name on the dextral side. Fig. 2 depicts the appearance presented by my dissection; and, as in the former diagram, there is noticeable a peculiar lozenge-shaped space between the two branches of the divided single carotid artery. This is existent, too, in all the birds, so far that I have examined, in which occurs the peculiar suppression of the left jugular vein, although in some the bifurcation is more nearly in relation with the great transverse venous trunk than in others.

With these facts before me, I was advised by Dr. Rolleston, to whom I gratefully express my indebtedness for much valuable assistance and unceasing kindness, to consult the memoir by Neugebaur contained in the 'Nova Acta,' vol. xxi., and entitled 'Systema venosum Avium cum eo mammalium, et imprimis hominis, collatum;' and in this little-known but exhaustive and pains-taking paper I found the following passages. (Before proceeding to quote, I may say I took occasion to verify the references to Barkow's own papers.)

"Barkow has three laws concerning the relative thickness and the presence of the jugular veins in birds:—

"1. A single jugular vein exists on each side of the neck, the one equal with the other.

"2. There is one on each side, of which one is greater (*fortior*) than the other. Or, lastly,

"3. One side only is provided with a jugular vein, the other has none (*alterum nulla*)."

Neugebaur, commenting on these rules, ventures to distrust the truth of the *third*, and imagines that instances adduced will fall under the second rule. In this connexion I much regret that I am unable to speak concerning the four species of Woodpecker (*Picus martius*, *P. viridis*, *P. major*, *P. medius*) with which Neugebaur associates Rathke as holding a view opposed to his own; and I shall be grateful to any one who will supply me with specimens of these birds. The Great Spotted Woodpecker (*P. major*) and *P. minor* (the Lesser Spotted Woodpecker) are said by Yarrell to frequent the neighbourhood of Kensington Gardens; but *P. martius* (the Great Black Woodpecker) is rare in this country.

Neugebaur's words on these birds are as follow:—"Quod denique attinet ad regulam tertiam, mihi met non contigit, ut avem ullam singula tantum vena jugulari præditam invenerim, et

saltem *Picum viridem*, cujus quidem generis alias species tres, *P. martium*, *P. majorem*, et *P. medium*, una tantum vena jugulari et quidem dextra præditas esse Rathkius docet, non huc, sed ad regulam secundam pertinentem cognovi."

I conceive it is quite possible Barkow might have made the error of supposing only one vein present, if his observations had been conducted on such a bird as the Short-tailed Tit, or even on a spirit specimen of a less distinctly atrophied bird. Still more might he have been misled in case of a Sparrow; for in this bird (*Passer domesticus*) but the veriest rudiment of the left vein exists, and it ceases to be a tubular structure at about half the length of the cervix from its origin. I very carefully threw a blue injection into the vessel from the transverse trunk at the skull-base, and got the fluid to run as a fine line so far as I have stated, where it was stayed by a blind ending of the vein, which beneath this point was indistinguishable from the fatty and connective tissue with which the pneumogastric nerve was associated.

In the only example of the Robin (*Erithacus rubecula*) I have had the fortune to examine, the two vessels showed a considerably greater disproportion than that figured by Neugebaur, a fact which leads me to think that *age* may, to great extent, determine the obliteration of an organ in natural atrophy; *i. e.* in this particular instance a young bird will possess a less-attenuated left jugular vein than an adult.

Examination of developmental changes, however, will afford much information in this matter; and I anticipate we shall find the growing embryo to exhibit gradations varying from equality in the size of the veins to the adult differences already noted. This would be in agreement with Von Baer's law of progress from the general to the special; for it is a fact worth knowing that all the birds, so far, exhibiting this considerable suppression of the left jugular vein have been from Prof. Huxley's division of the *Ægithognathæ*. Moreover Alectoromorphous birds show gradations of structure varying from close equality to differences as much as one to three, beyond which they would seem not to approach the group named above.

How far the peculiarities I have described are structural adaptations subserving function, I hope to be able to speak with some authority later, as also regarding their full morphological import. I can do no more now than state my full conviction that they possess a definite meaning, and one to be determined by the spe-

cial functional (?) requirements of the organism. It is these requirements that need further elucidation.

In conclusion, I wish to say this paper is intended to be only preliminary to a more extended series of observations on the points it discusses; and though it may seem a meagre production, I fancied that even such brief notes might claim notice by this Society.

I shall be very grateful to any one who will help me to obtain spirit specimens of the rarer birds, and especially of the genus *Picus*.

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A List of Marine Shells, chiefly from the Solomon Islands, with Descriptions of several new Species. By EDGAR A. SMITH, F.Z.S., Zoological Department, British Museum. Communicated by Dr. J. MURIE, F.L.S.

[Read April 6, 1876.]

(PLATE XXX.)

THE shells enumerated in the following paper have been presented to the British Museum by Mr. John Brazier, of Sydney. A list of them was thought worthy of publication, as precise localities, in most instances, are attached to them, the majority having been collected by Mr. Brazier himself. At the same time, the habitats originally assigned to the various species by the authors are quoted, since so many which are given to species in the Cumingian collection are erroneous.

1. *CONUS MAGUS*, Linn. Kiener, *Coq. Viv.* pl. 67. f. 1-1 c; Reeve, *Conch. Ic.* f. 190 a-e; Sowerby, *Thesaurus Conch.* f. 508-512 & f. 513, 514, & 525 (as *C. circæ*); Weinkauff in Küster's *Conch.-Cab.* pl. 6. f. 1 & 3, pl. 15. f. 3, 4, pl. 19. f. 5, 6, pl. 57. f. 8-11.—Var. = *C. indicus*, Chemnitz, *Conch.-Cab.* x. f. 1295.—*C. clandestinus*, Chemnitz, *l. c.* f. 1296.—*C. circæ*, Chemnitz, *l. c.* xi. f. 1778-9.—*C. fenellus*, Chemnitz, *l. c.* xi. f. 1782-3; Küster, pl. 26. f. 12, 13.—*C. raphanus*, Hwass, Sowerby, *Thesaurus*, f. 494; Küster, pl. 2. f. 3.—*C. carinatus*, Swainson, Reeve, *Conch. Ic.* f. 175; Kiener, pl. 27. f. 2-2a; Sowerby, f. 495.—*C. ustulatus*, Reeve, f. 239; Sowerby, f. 516 & 647; Küster, pl. 52. f. 3, 4.—*C. epistomium*, Reeve, f. 227 a, b; Kiener, pl. 55. f. 6; Sowerby, f. 515.—*C. epistomioides*, Weinkauff, Küster's *Conch.-Cab.* pl. 57. f. 6-7.—*C. striolatus*, Kiener, pl. 105. f. 1; Reeve, *Suppl.* pl. 6. f. 262; Sowerby, f. 327, 328 (as *ustulatus*).—*C. borneensis*.